Status Report - SVBR-100 (Russian Federation)

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1. Overview

- ☐ **In Operation**
- ☐ **Under Construction**
- ☐ **Described in**

Link to PRIS	--

- ☑ **New Concept**

Number of Units	--
Year	2030

Reference Plant

Name of Site	--
Link to PRIS	--
Net Power Output (MWe)	100
Gross Power Output (MWe)	--

1.1 Introduction

This reactor design is a new concept with a projected earliest deployment (start of construction) time no later than 2030.

SVBR-100 is a multipurpose small modular lead-bismuth (LBE) cooled fast reactor with an equivalent electric capacity of 100 MW. The design is based on dozens of reactor-years of experience in LBE cooled reactor operation.

Its main features are:

- Enhanced inherent safety and passive safety systems as well as significant simplification of the design of the reactor and the entire nuclear plant that results in competitive economics;
- Capability to operate with different types of fuel in both open and closed nuclear fuel cycle with refuelling every 6 - 7 years;
- Compact design as well as maximum prefabrication of the reactor and its transportability, including railway;
- Capability to design modular NPPs and energy complexes with installed capacity being a multiple of the number of reactor units.

Target application: multi-purpose application of standardized modular nuclear energy complexes of different capacities (100 – 600 MW(e)) equipped with SVBR-100 reactors for mature, emerging and prospective goods and services markets: power, heat (process heat and centralized district heating), cooling, desalination, hydrogen and burning minor actinides.

1.2 Development Milestones

2009	Set up of AKME-engineering JSC – the project operator
2015	Release of the design documentation of the FOAK NPP
2016	Prospecting partners in countries where the project can be potentially deployed
2029	To complete R&D and obtain a construction license for the FOAK NPP
2029	To complete the construction and commission the FOAK NPP as well as to obtain the operation license

1.3 Design organization or vendor company

info@svbr.org

1.4 Links to designer/vendor website

1.5 Design Description

Main design solutions:

- Fast neutron spectrum;
- Uranium oxide fuel was used as the main type of fuel for the FOAK;
- Maximum local burnup in the FOAK design - no more than 10% h.a., which is a convincingly mastered level for fast neutron reactors in operation;
- Assembly-by-assembly unloading of spent fuel from the reactor at the end of the core lifetime is immediately and seamlessly followed by the loading of a fresh core;
- A two-circuit heat-removal system with an integrated primary circuit with LBE and a modular steam generator (SG) producing saturated steam, a steam separator and multiple forced circulation of the secondary circuit coolant are applied;
- All primary circuit equipment is located inside the reactor vessel (monoblock), hydraulic connections are designed without the use of pipelines and fittings;
- The natural circulation in the primary and secondary circuits is sufficient for decay heat removal from the rated power level without dangerous overheating of the core;
- Proven solutions have been used for the heat removal through the passive heat removal system (PHRS) from the SG independently from the turbine system;

- The main components of the reactor are designed in the form of separate modules, providing the capability of their replacement and repair;
- The reactor has such weight and size characteristics that make it capable to be completely manufactured at factory and be delivered to the plant site by water, road or rail.

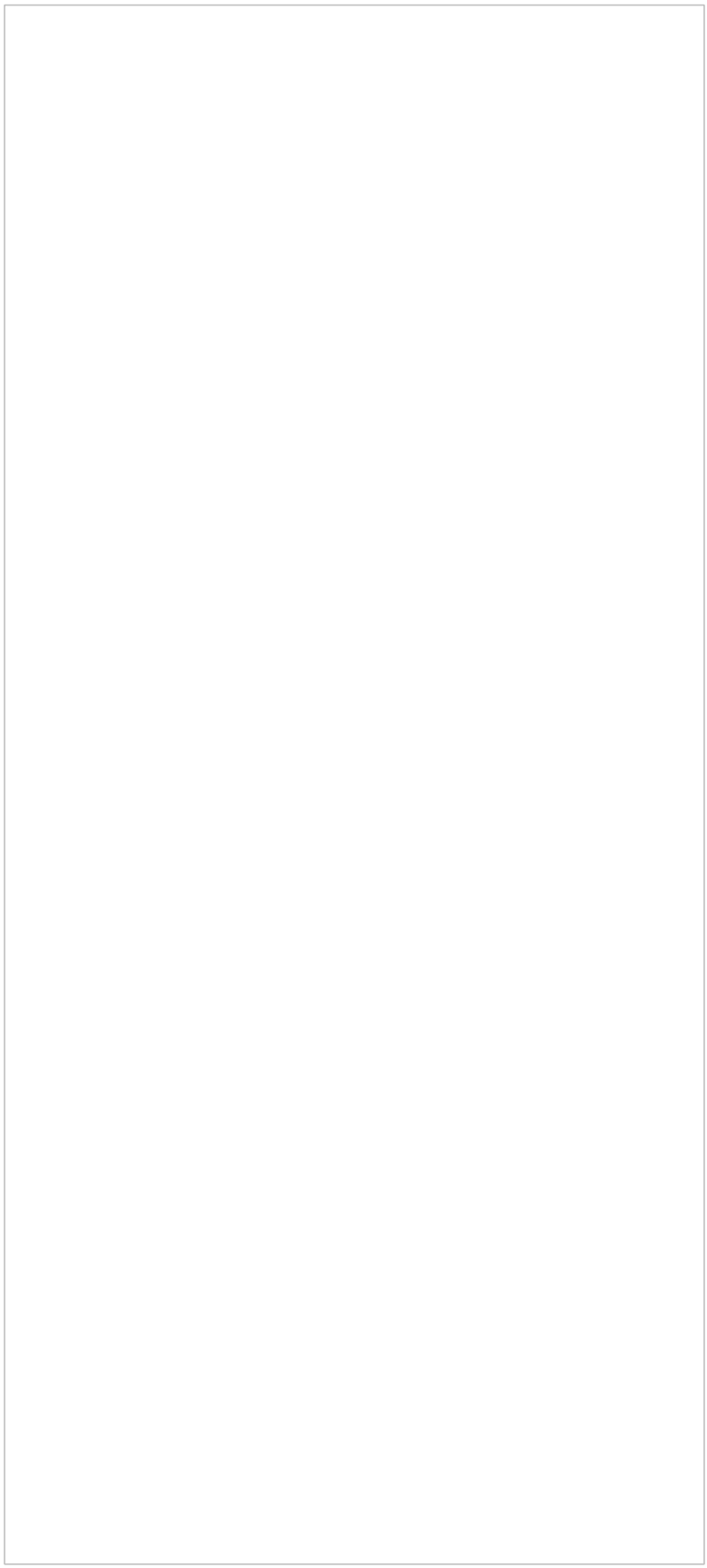


Figure 1. Representative picture of the reactor.

1.6 Licensing Application Support Documents

Most Recent Licensing Application Support Document:

- PSAR for siting license for the FOAK NPP (issued in 2015).

1.7 Reactor Unit in PRIS

2. Category Fields

Table 1: ARIS Category Fields

ARIS Category	Value	Units of Examples
Current/Intended Purpose	Prototype/FOAK	e.g. Commercial – Electric/Non-electric, Prototype/FOAK, Demonstration, Experimental
Main Intended Application (once commercial)	Baseload	e.g. Baseload, Dispatchable, Off-grid/Remote, Mobile/Propulsion, Non-electric (specify)
Reference Location	Inland	e.g. On Coast, Inland, Below-Ground, Floating-Fixed, Marine-Mobile, Submerged-Fixed (Other-specify)
Reference Site Design (reactor units per site)	Single Unit	e.g. Single Unit, Dual Unit, Multiple Unit (# units)
Core Coolant	PbBi	H2O, D2O, He, CO2, Na, Pb, PbBi, Molten Salts, (Other-specify)
Reactor Core Size (1 core)	30 MWth <= Thermal power < 1000 MWth	e.g. Thermal Power < 30 MWth, 30 MWth ≤ Thermal power < 1000 MWth, 1000 MWth ≤ Thermal power ≤ 3000 MWth, Thermal power > 3000 MWth
Reactor Type	LFR	e.g. PWR, BWR, HWR, SCWR, GCR, GFR, SFR, LFR, MSR, ADS
Reactor Size	SMR	e.g. PWR, SMR

Neutron Moderator	None	e.g. H2O, D2O, He, CO2, Na, Pb, PbBi, Molten Salts, (Other-specify)
NSSS Layout	Integral	e.g. Loop-type (# loops), Direct-cycle, Semi-integral, Integral, Pool-type
Primary Circulation	Forced (2 pumps)	e.g. Forced (# pumps), Natural
Thermodynamic Cycle	Rankine	e.g. Rankine, Brayton, Combined-Cycle (direct/indirect)
Secondary Side Fluid	H2O	e.g. H2O, He, CO2, Na, Pb, PbBi, Molten Salts, (Other-specify)
Fuel Form	Fuel Assembly/Bundle	e.g. Fuel Assembly/Bundle, Coated Sphere, Plate, Prismatic, Contained Liquid, Liquid Fuel/Coolant
Fuel Lattice Shape	Triangular	e.g. Square, Hexagonal, Triangular, Cylindrical, Spherical, Other, n/a
Rods/Pins per Fuel Assembly/Bundle	198	e.g. #, n/a
Fuel Material Type	Oxide	e.g. Oxide, Nitride, Carbide, Metal, Molten Salt, (Other-specify)
Design Status	Detailed Design	e.g. Conceptual, Detailed, Final (with secure suppliers)
Licensing Status	PSAR	e.g. DCR, GDR, PSAR, FSAR, Design Licensed (in Country), Under Construction (# units), In Operation (# units)
Neutron Spectrum	Fast	e.g. Fast, Thermal

3. Parameter Fields

Table 2: ARIS Parameter Fields

ARIS Parameter	Value	Units of Examples
Plant Infrastructure		
Design Life	50	Years

Lifetime Capacity Factor	90	%, defined as Lifetime MWe-yrs delivered / (MWe capacity * Design Life), incl. outages
Major Planned Outages	60 days every 72-84 months for refuelling	# days every # months (specify purpose, including refuelling)
Operation / Maintenance Human Resources	120/54	# Staff in Operation / Maintenance Crew during Normal Operation
Reference Site Design	1	n Units/Modules
Capacity to Electric Grid	100 (89) in condensing mode; 77.2 (66.2) in co-generation mode	MWe (net to grid)
Non-electric Capacity	100 Gcal/h heat supply in cogeneration mode	e.g. MW(th) heat at x ºC, m3/day desalinated water, kg/day hydrogen, etc.
In-House Plant Consumption	11	MWe
Plant Footprint	34000	m2 (rectangular building envelope)
Site Footprint	150000	m2 (fenced area)
Emergency Planning Zone	NPP site (0.44 x 0.341)	km (radius)
Releases during Normal Operation	no more than 690 (Noble Gases)	TBq/yr (Noble Gases / Tritium Gas / Liquids)
Load Following Range and Speed	50 – 100%, 2%	x – 100%, % per minute
Seismic Design (SSE)	Reactor: 0.25 g; build.: 0.12 g	g (Safe-Shutdown Earthquake)
NSSS Operating Pressure (primary side)	0.11	MPa(abs), i.e. MPa(g)+0.1, at core outlet
NSSS Operating Pressure (secondary side)	7	MPa(abs), i.e. MPa(g)+0.1, at secondary side outlet
Primary Coolant Inventory (incl. pressurizer)	~315000	kg
Nominal Coolant Flow Rate (primary)	13968	kg/s
Nominal Coolant Flow Rate (secondary)	536	kg/s
Core Inlet Coolant Temperature	335	ºC

Core Outlet Coolant Temperature	477	ºC
Available Tempeature as Process Heat Source	~280 (potentially up to 500)	ºC
NSSS Largest Component	RPV with SG evaporators	e.g. RPV (empty), SG, Core Module (empty/fuelled), etc.
- NSSS Largest Component Length	6530	mm
- NSSS Largest Component Diameter	4400	mm
- NSSS Largest Component Thickness		mm
- NSSS Largest Component Weight	280	tonne
Reactor Vessel Material	stainless steel	e.g. SS304, SS316, SA508, 800H, Hastelloy N
Steam Generator Design	Vertical, bayonet tubes	e.g. Vertical/Horizontal, U-Tube/ Straight/Helical, cross/counter flow
Secondary Coolant Inventory	~20000	kg
Pressurizer Design	not applicable	e.g. separate vessel, integral, steam or gas pressurised, etc.
Pressurizer Volume	not applicable	m3 / m3 (total / liquid)
Containment Type	Dry (double)	Dry (single/double), Dry/Wet Well, Inerted, etc.
Containment Volume	4000	m3
Spent Fuel Pool Capacity and Total Volume	dry storage 12 years of full-power operation	Years of full-power operation / m3
Non Electric Application		-
Core Delta Temperature	142	ºC
Fuel/Core		
Single Core Thermal Power	280	MW(th)
Refuelling Cycle	72-84	months or “continuous”
Fuel Material	UO2 - FOAK; UO2 / (U-Pu)O2 / (U Pu)N / (U-Pu)C - NOAK	e.g. UO2, MOX, UF4, UCO
Enrichment (avg./max.)	16.7 / 19.5	%
Average Neutron Energy	> 100 keV	eV

Fuel Cladding Material	ferritic-martensitic steel	e.g. Zr-4, SS, TRISO, E-110, none
Number of Fuel “Units”	61 fuel assembly	Specify as Assembly, Bundle, Plate, Sphere, or n/a
Weight of one Fuel Unit	~300	kg
Total Fissile Loading (initial)	~10 t UO2	kg fissile material (specify isotopic and chemical composition)
% of fuel outside core during normal operation	not applicable	Applicable to online refuelling and molten salt reactors
Fraction of fresh-fuel fissile material used up at discharge	not applicable	%
Core Discharge Burnup	~65	MWd/kgHM (heavy metal, eg U, Pu, Th)
Pin Burnup (max.)	~100	MWd/kgHM
Breeding/Conversion Ratio	With the mastered uranium oxide fuel - less than one. With MOX, mixed nitride uranium-plutonium fuel - larger than one.	Fraction of fissile material bred in-situ over one fuel cycle or at equilibrium core
Reprocessing	None for FOAK	e.g. None, Batch, Continuous (FP polishing/actinide removal), etc.
Main Reactivity Control	Control rod with absorbing elements made of boron carbide	e.g. Rods, Boron Solution, Fuel Load, Temperature, Flow Rate, Reflectors
Solid Burnable Absorber	not applicable	e.g. Gd2O3
Core Volume (active)	2	m3 (used to calculate power density)
Fast Neutron Flux at Core Pressure Boundary	~1E+9, at RPV (E>0.1MeV)	n/(cm²*s)
Max. Fast Neutron Flux	~1E+15 (E>0.1MeV)	n/(cm²*s)
Core Control Rod Absorber		-
Core Soluble Neutron Absorber		-
Safety Systems		
Number of Safety Trains	Active / Passive	% capacity of each train to fulfil safety function
- reactor shutdown	Active/Passive	100 / 100 / -

- core injection	N/A	100 / 100 / -
- decay heat removal	Active/Passive	100 /100 / -
- containment isolation and cooling	Active/Passive	100 / 100 / -
- emergency AC supply (e.g. diesels)	Active/Passive	100 / 100 / -
DC Power Capacity (e.g. batteries)	1	Hours
Events in which Immediate Operator Action is required	none	e.g. any internal/external initiating events, none
Limiting (shortest) Subsequent Operator Action Time	72	Hours (that are assumed when following EOPs)
Severe Accident Core Provisions	No core melt. Water flooding of the reactor shaft	e.g. no core melt, IVMR, Core Catcher, Core Dump Tank, MCCI
Core Damage Frequency (CDF)	≤ 10-6/(reactor-year) - according to the regulatory requirements. The specific value will be determined at subsequent stages of development.	x/reactor-year (based on reference site and location)
Severe Accident Containment Provisions	There is no need	e.g., H2 ignitors, PARs, filtered venting etc.
Large Release Frequency (LRF)	≤ 10-7/(reactor-year)	x/reactor-year (based on reference site and location)
Overall Build Project Costs Estimate or Range (excluding Licensing, based on the Reference Design Site and Location)		
Construction Time (nth of a kind)	30-36 (for single unit NPP)	Months from first concrete to criticality
Design, Project Mgmt. and Procurement Effort	to be determined by construction license	Person-years (PY) [DP&P]
Construction and Commissioning Effort	to be determined by construction license	PY [C&C]
Material and Equipment Overnight Capital Cost	to be determined by construction license	Million US$(2015) [M&E], if built in USA
Cost Breakdown	%[C&C]/%[M&E]	
- Site Development before first concrete	to be determined by construction license	(e.g. 25/10) (30/40)
- Nuclear Island (NSSS)	to be determined by construction license	

- Conventional Island (Turbine and Cooling)	to be determined by construction license	(20/25) (20/10) (5/15) (----------) (to add up to 100/100)
- Balance of Plant (BOP)	to be determined by construction license	
- Commissioning and First Fuel Loading	to be determined by construction license	
Factory / On-Site split in [C&C] effort	to be determined by construction license	%/% of total [C&C] effort in PY (e.g., 60/40)
Nuclear System		
System Steam Flow Rate		kg/s
System Steam Pressure		MPa
System Steam Temperature		ºC
System Feedwater Flow Rate		kg/s
System Feedwater Temperature		ºC
Reactor Core		
Active Core Height		m
Equivalent Core Diameter		m
Average Linear Heat Rate		kW/m
Average Fuel Power Density		kW/kgU
Average Core Power Density	140	MW/m3
Outer Diameter Of Fuel Rods		mm

4. Plant Layout, Site Environment and Grid Integration

SUMMARY FOR BOOKLET

The FOAK NPP will be a single-module with installed capacity of 100 MWe. The layout of the FOAK NPP is shown in Figure 1. The reactor compartment is monolithic reinforced concrete, the reactor is separated from the external environment by two reinforced concrete shells: the outer one without cladding and the inner one lined with metal cladding. The turbine compartment is an above-ground part of a metal frame. The controlled access zone is in the reactor compartment and the RW processing building. Spent fuel dry storages are part of the reactor compartment. A evaporative cooling tower is used for the technical water supply of the NPP. The output electric energy parameters from NPP into grid are ~89 MW, 50 Hz, 110 kV. NPP own needs (~11 MW) are powered by a

turbogenerator and an external 110 kV grid. If regular energy supply is lost, the backup energy supply (batteries, diesel generators) is automatically connected.

The NOAK NPP will have from one to six modules, depending on a particular customer needs.



Figure 2. The layout of the FOAK NPP.

4.1 Site Requirements during Construction
4.2 Site Considerations during Operation
4.3 Grid Integration

5. Technical NSSS/Power Conversion System Designn

SUMMARY FOR BOOKLET

Primary circuit

The integrated reactor was designed with the placement of all primary circuit equipment (core, pumps, steam generators) in a single vessel (monoblock) a design which completely excludes pipelines from the primary circuit. The vessel is surrounded by a protective casing.

Reactor core and fuel

At the first stage it will be the mastered uranium oxide fuel. SVBR-100 reactor pursues resistance to nuclear fissile material proliferation by using uranium with enrichment below 20%. The reactor is designed to operate with 6 -7 years between refueling. Maximum local burnup in the FOAK design is about 10%.

At the next stage MOX, uranium nitride or mixed uranium-plutonium nitride fuel can also be used.

Fuel handling

SVBR-100 reactor core is refueled altogether, no partial refueling designed. Assembly-by-assembly unloading of spent fuel from the reactor at the end of the core lifetime is provided. The fresh core is loaded at the same time in the assembly. Spent fuel with a high level of decay heat is stored in dry storage in special cases.

Reactor protection

Efficiency of the single absorbing rod does not exceed 0,5 βeff, a feature that along with the technical performance of the control and protection system excludes a possibility of prompt neutrons criticality in the reactor. Control and protection system has additional emergency protection rods with a passive principle of operation.

The natural circulation in the primary and secondary circuits is sufficient for decay heat removal from the rated power level without dangerous overheating of the core. The passive heat removal system (PHRS) from the SG does not depend on turbine systems and combines the functions of both, normal operation and safety.

The reactor has only one special safety system – gas-vapor mixture receiver system for the event of a leak or rupture of the steam generator tubes.

Secondary side

The secondary side design with multiple forced circulation (MFC) circuit including 12 steam generator (SG) evaporation modules divided into 4 independent loops is applied.

The assumed parameters of the steam and power cycle of the turbine are identical to the parameters of modern PWR reactors. Figure 2 shows the basic hydraulic diagram of the NSSS SVBR-100.

Containment/Confinement

If the primary circuit is depressurized, the pressure in the reactor compartment does not increase. The reactor compartment is designed for an accident with depressurization of the second circuit with a non-radioactive water-steam mixture with a pressure of 7 MPa, and also for a set of external effects (seismic, shock wave, plane crash).

Electrical, I&C and human interface

These systems and equipments use industry well-mastered solutions; the specific execution depends on the placement site, regulatory requirements, and customer requirements.

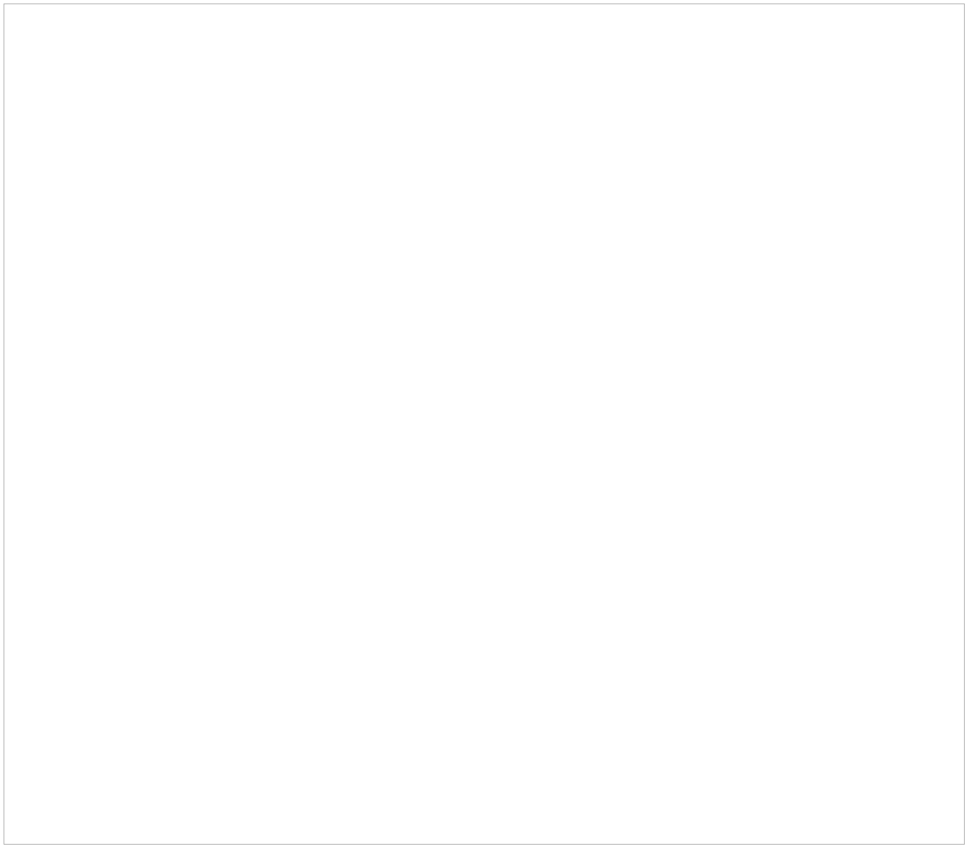


Figure 3. The basic hydraulic diagram of the NSSS SVBR-100.

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5.7 Electrical, I&C and Human Interface

These systems and equipments use industry well-mastered solutions; the specific execution depends on the placement site, regulatory requirements, and customer requirements.

5.8 Unique Technical Design Features (if any)

Closed nuclear fuel cycle with mixed oxide uranium plutonium fuel; operation in a fuel self-sufficient mode *) figures shown above are targeted parameters for SVBR-100

6. Technology Readiness

SUMMARY FOR BOOKLET

Lead-bismuth cooled reactor technology has been in development in Russian Federation for more than half a century and continues today. The development of SVBR-100 is based on the experience built in the design and operation of several ground prototypes and LBE power modules.

The reactor design SVBR-100 is characterized by a high degree of elaboration and adoption of all basic technical solutions for all the main elements and equipment of the reactor. A number of key experimental and technological R&D have been carried out to substantiate the reactor design. The main directions of further R&D: certification of structural materials and design codes, conducting

reactor fuel tests, safety justification on large-scale thermohydraulic stands. The design documentation of the FOAK with SVBR-100 reactor has been developed in accordance with the requirements set forth in Russian Federation Government Resolution No. 87 of February 16, 2008.

SVBR-100 design possesses about 60 patent families which successfully patented in various countries over the world.

Interaction with Nuclear Safety Authority started. As part of the interaction with the regulator, the analysis of the adequacy of the regulatory framework was carried out and a program for the development of necessary regulatory documents was prepared.

Siting license for the FOAK NPP was issued by the regulator in 2015.

6.1 Deployed Reactors
6.2 Reactors under Licensing Review
6.3 Reactors in the Design Stage

7. Safety Concepts

SUMMARY FOR BOOKLET

Basic physics underlies high level of inherent safety and passive safety systems:

First, this is the potential energy contained in the coolant. At atmospheric pressure, LBE does not accumulate such potential energy, which in case of an accident is capable to destroy the protective barriers, damage the core and cause a catastrophic release of radioactivity. Potential energy contained in each type of coolant stems from the respective coolant type natural properties that cannot be changed by any technical solutions.

Second, it is the integral layout of the reactor facility that completely eliminates pipelines and valves with radioactive coolant and eliminates the possibility of leakage of the coolant that is operated at atmospheric pressure.

Finally, this is a fast neutron reactor, which characteristically exhibits no poisoning effects, low burnup reactivity margin, low value of negative temperature reactivity effect, and low negative void reactivity effect. Efficiency of the strongest absorbing rod does not exceed 0,5 βeff, a feature that along with the technical performance of the control and protection system excludes a possibility of prompt neutrons criticality in the reactor.

Safety systems features:

The passive heat removal system combines the functions of both, normal operation and safety.

The reactor has only one special safety system – gas-vapor mixture receiver system for the event of a leak or rupture of the steam generator tubes. In case of a large leak, that leads to increase in pressure in the reactor to 0,5 MPa, the gas-vapor mixture is discharged through the rupture membrane into the bubbler tank.

7.1 Safety Philosophy and Implementation
7.2 Transient/Accident Behaviour

8. Fuel and Fuel Cycle

SUMMARY FOR BOOKLET

The design makes it capable to operate both in open and closed nuclear fuel cycles. At the first stage it will be the typical uranium oxide fuel with the core breeding ratio (CBR) less than 1. MOX fuel can also be used, driving the CBR to just about 1, which makes it capable to operate in fuel self-sufficient mode in the closed fuel cycle. If UO2 is loaded as the starting fuel, the fuel cycle can be closed by refuelling the reactor with recycled spent starting fuel in 15 years. It is also capable to use nitride uranium or mixed nitride uranium-plutonium fuel to improve safety and fuel cycle characteristics. SVBR-100 reactor pursues resistance to nuclear fissile material proliferation by using uranium with enrichment below 20% while using uranium oxide fuel in the starting core.

The reactor is designed to operate with 6 -7 years between refuelling.

SVBR-100 reactor core is refuelled altogether, no partial refuelling designed.

Spent fuel with a high level of decay heat is stored in dry storage in special cases.

8.1 Fuel Cycle Options
8.2 Resource Use Optimization
8.3 Unique Fuel/Fuel Cycle Design Features

9. Safeguard & Physical Security

SUMMARY FOR BOOKLET

The SVBR reactor provides technological support for the non-proliferation of nuclear materials through the following technical solutions and features of the fuel cycle:

- The use of U-235 fuel with enrichment <20;
- A relatively long core life time (about 6-7 years), the need for a 30-day SNF exposure before refuelling (to reduce the decay heat release), the need to use specialized mechanical-handling equipment to operate with SNF and massive elements of the reactor;
- The compact layout of the core and, as a result, the absence of space for unauthorized material irradiation (absence of breeding areas in reflector or in-vessel FA storage to place fertile materials);

- The significant sensitivity of core reactivity and thermohydraulic to fertile materials addition

9.1 Safeguards
9.2 Security
9.3 Unique Safeguards and/or Security Features

10. Project Delivery & Economics

SUMMARY FOR BOOKLET

Project preparation and negotiation

It is planned that the project owner would be an established arm of SVBR technology vendor in alliance with regional utilities, financial institutions or end users. Project implementation and project pricing model will depend on the market and political environment as well as on regulatory regime and acceptance of standardized SVBR plant design and will be chosen from the list of the following options: turnkey, turnkey and concession or BOO. Depending on the end user requirements, prevailing regional generation mix as well as local market dynamics and profile the most suitable type design of the plant will be chosen from the range of products. Projects that enable co-generation will be a priority. Capabilities to flex generation to match the demand volatility might be exploited to enhance project economics. Long-term supply arrangement at a stable price as well as project finance arrangement are embeddable into our offer. It is planned to involve public stakeholders early to secure public acceptance of the project.

Construction and commissioning

High level of inherent safety SVBR reactor, passive safety systems, early FID and long-lead items contracting, factory assembly and transportability of SVBR reactor as well as flow line organization of construction are key enablers to reach planned construction time schedule, compliance with planned budget and minimizing financial risks. Multiple package contract structure with integrated project management is to be employed by the project owner, who will perform EPCM function, will be engineer-architect and supply chain architect for the project. It is planned to adopt a collaborative approach with contractors including time schedule and pricing risk sharing as well as incentive schemes. Long-term relationship with main equipment manufacturers will be the foundation of the supply chain. Of-the-shelf manufacturing of large components will be relied upon subject to compliance with regulatory environment. We plan to rely on the local qualified labor in performing some construction works.

Operation and maintenance

It is planned to implement comprehensive operating staff educational and training program at SVBR vendor training center equipped with simulators and operating components. The availability of local labor that will meet vendor’s initial qualification requirements will enhance project’s economics. It is

anticipated that accident insurance costs will be substantially lower than for current generation of nuclear power technologies as certain types of accidents are deterministically not possible with SVBR reactor design and it is thought that a DBA in the extreme scenario will not require the population evacuation.

The fuel lifetime depends on the reactor capacity utilization, minimum being at ~6 years at 100% capacity factor. SVBR reactor prominent feature is its capability to work in both open and closed nuclear fuel cycle. In the latter case the end product price stability can be secured for the entire project lifetime as SVBR reactor breeding ratio is circa 1. The demand for natural uranium, conversion and enrichment will be reduced to virtually zero. The capability to choose either uranium oxide or MOX fuel gives an opportunity chose least costly option and gain overall cost advantage for the plant.

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It is planned to implement comprehensive operating staff educational and training program at SVBR vendor training center equipped with simulators and operating components. The availability of local labor that will meet vendor’s initial qualification requirements will enhance project’s economics. It is anticipated that accident insurance costs will be substantially lower than for current generation of nuclear power technologies as certain types of accidents are deterministically not possible with SVBR reactor design and it is thought that a DBA in the extreme scenario will not require the population evacuation.

The fuel lifetime depends on the reactor capacity utilization, minimum being at ~6 years at 100% capacity

factor. SVBR reactor prominent feature is its capability to work in both open and closed nuclear fuel cycle. In the latter case the end product price stability can be secured for the entire project lifetime as SVBR reactor breeding ratio is circa 1. The demand for natural uranium, conversion and enrichment will be reduced to virtually zero. The capability to choose either uranium oxide or MOX fuel gives an opportunity chose least costly option and gain overall cost advantage for the plant.